Notice No.6

Rules and Regulations for the Classification of Special Service Craft

July 2019

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: June 2020

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Part 3, Chapter 1, Section 6	1 July 2020	1 July 2020
Part 3, Chapter 2, Section 4	1 July 2020	N/A
Part 3, Chapter 3, Section 3	1 July 2020	N/A
Part 3, Chapter 5, Section 8	1 July 2020	1 July 2020
Part 3, Chapter 7, Section 1 – 6 (new)	1 July 2020	N/A
Part 4, Chapter 2, Section 6	1 July 2020	NA
Part 4, Chapter 3, Section 1	1 July 2020	N/A
Part 6, Chapter 2, Section 3	1 July 2020	1 July 2020
Part 6, Chapter 6, Section 2	1 July 2020	NA
Part 7, Chapter 2, Section 3	1 July 2020	1 July 2020
Part 14, Chapter 1, Section 6	1 July 2020	1 July 2020

Part 3, Chapter 1
General Regulations

■ *Section 6*
Definitions

6.2 Principal particulars

6.2.9 **Draught**, *T*, is the summer draught, in metres, measured from top of keel. Where a deeper ‘scantling draught’ has been specified by the designer, this is to be used instead.

Part 3, Chapter 2
Craft Design

■ *Section 4*
Bulkhead arrangements

4.2 Number and disposition of bulkheads

~~4.2.3 In all craft with a Rule length, L_R, less than or equal to 25 m, the sterntube is to be enclosed in a watertight compartment, wherever practicable.~~

~~4.2.4~~ 4.2.3 ~~All craft with a Rule length, L_R, greater than 25m are to have an aft peak bulkhead, generally enclosing the sterntubes in a watertight compartment.~~ Where the aft peak bulkhead does not enclose the hull penetration for the sterntube, *see Pt 3, Ch 3, 3.13 Sterntubes 3.13.14*.

Existing paragraphs 4.2.5 to 4.2.10 have been renumbered 4.2.4 to 4.2.9.

4.4 Aft peak bulkhead

4.4.1 An aft peak bulkhead, where required to be fitted (in each half of a multi-hull craft) is, in general, to enclose the sterntube, water jet unit, etc. in a watertight compartment. Where the aft peak bulkhead does not enclose the hull penetration for the sterntube, waterjet unit, etc. *see Pt 3, Ch 3, 3.13 Sterntubes 3.13.14*. ~~In twin screw craft the sterntubes are to be enclosed in suitable watertight spaces.~~ *See also Table 2.4.1 Total number of bulkheads.*

Part 3, Chapter 3
Control Systems

■ *Section 3*
Sternframes and appendages

3.13 Sterntubes

3.13.14 Where difficulty in welding or bonding of sterntube to the hull is anticipated due to small clearances or tight angles, a local cofferdam or watertight compartment of moderate volume is to be fitted enclosing the hull penetration and the sterntube. Where the sterntube penetrates the inboard boundary of the watertight compartment or cofferdam, it is to be suitably supported and sealed.

Part 3, Chapter 5
Anchoring and Mooring Equipment

■ *Section 8*
Anchor windlass design and testing

8.13 Marking and identification

8.13.1 The windlass is to be permanently marked with the following information:

(a) ~~Nominal size of the cable chain including mean diameter, grade and percentage of the breaking load the windlass is designed to hold (e.g. 100/3/45).~~ The size designation of the windlass (e.g. 100/3/45, where 100 is the nominal diameter of the chain cable in mm, 3 is the numeral in the chain cable steel grade U3, and 45 refers to the holding load expressed as a percentage of the chain cable breaking load).

(b) Maximum anchorage depth, in metres.

Part 3, Chapter 7
Wind propulsion systems

■ *Section 1*
General

1.1 Applicability

1.1.1 This Chapter applies to craft that are fitted with a rig used for propulsion by wind force.

1.1.2 This Chapter applies to the rig insofar as this structure is used for propulsion purposes. The actual propulsion force may be generated by sails that are hoisted on the mast (e.g. fore-and-aft rig), rotation of the mast structure itself (e.g. Flettner rotors), or other means that capture wind force and transfer it to the hull (e.g. DynaRig).

1.1.3 Other elements of wind propulsion systems such as sails and running rigging are excluded from this Chapter.

1.1.4 Rigs, from an arrangement point of view, that do not fit into the assessment structure as laid out in this Chapter, will be considered on an equivalence basis.

1.1.5 Attention is drawn to the requirements of the Flag Administration regarding the application of certain materials, systems, criteria or practices.

1.2 Definitions

1.2.1 'The rig' in this Chapter is defined as all the structure and equipment essential for the safe operation of a wind propulsion system.

1.3 Class notations

1.3.1 **RIGGING**. The **RIGGING** notation will be assigned where a new craft is fitted with a rig used for propulsion by wind force which is in accordance with the Rules.

1.3.2 **RIGGING***. Upon request, the **RIGGING*** notation will be assigned where an existing craft is fitted with a rig used for propulsion by wind force where:

- the rig design complies with requirements of this Chapter;
- maintenance records starting at the time of first stepping are available and assessed;
- service history is available and assessed; and
- a rig behaviour trial is carried out. *See Pt 3, Ch 7, 5 Rig behaviour trial*.

1.4 Submissions requirements

1.4.1 In addition to submissions required by *Pt 3, Ch 1, 5 Information required*, plans and information are to be submitted as required in *Table 7.1.1 Plans and particulars to be submitted* as applicable.

Table 7.1.1 Plans and particulars to be submitted

Document	For information, *see* Note	For appraisal, *see* Note
Technical Construction File (TCF) *see Pt 3, Ch 7, 1.5 The Technical Construction File*, additionally including:		X
Transport and handling procedures		
Dock tune procedure		
Maintenance manual		
Material certification		
General wind propulsion layout plan	X	
Deck hardware plan	X	
Deck fittings for cleats, sheet winches, sheet tracks, travellers, etc. and through-deck fittings	X	
Mast, spreader and spar sections		X
Limit load and working load on mast foundation	X	
Mast loadings	X	
Bowsprit arrangement with all its stays and loadings	X	
Rig loadings	X	
Mast step	X	
Mast bearing integration and its foundation in the case of AeroRig/DynaRig		X
Chainplates, furlers, forestay and backstay attachments	X	
Ballast keel securing arrangements including information of the mass of the keel and ballast and its centre of gravity, including keel trunk	X	
Dagger board arrangement	X	
Rudder skeg construction and support details	X	
Note. X indicates reason for submission.		

1.5 The Technical Construction File

1.5.1 A Technical Construction File (TCF) is to be maintained during the design, construction, stepping and commissioning phases.

1.5.2 The TCF will be the basis for appraisal.

1.5.3 The TCF will include a:

- Global design description which is to include a sail plan(s) with standing and running rigging shown. The sails that are carried on board and that can be used in the sailing conditions are to be described.
- Methodology description which gives the methods used for calculations and predictions, and explains the computational approach applied to the rig scantling design.
- Load case definition. A list of load cases for which the rig is designed. As a minimum, the applied load cases will be limit cases. The load case definition is to include:
  - operation at sea;
  - manufacture (if considered applicable);
  - transport;
  - stepping;
  - maintenance (if considered applicable); and
  - survival.
- Structural design definition, which is a collection of documents and plans showing dimensions, materials, and cross-sections of all elements making up the structural integrity of the rig. Limit loads are to be defined for each of the elements. *See also Pt 3, Ch 7, 2.3 Stress factors (SF)*.
- Design evaluation report, which is to show that, in any of the design load cases, the loads on elements do not exceed permissible values. Rig foundation loads (e.g. mast step, chain plates, winch foundations and strong points) are part of the hull appraisal but may be taken into consideration in the design evaluation report.
- Materials certification report, which includes a declaration from the manufacturer that all construction materials are compliant with the structural design definition and will be examined using spot checks.
- Rig stepping report, which is to include the transport and stepping procedure as provided by the manufacturer and is to be to the satisfaction of the attending Surveyor.
- Rig behaviour report, which is to include a minimum of three sailing conditions which are included in the rig operation manual. It is a factual statement of observations made during trials with particular focus on agreement between predicted condition and actual performance. The report and observations are to be to the satisfaction of the attending Surveyor.
- Rig maintenance manual which is, as a minimum, to include maintenance instructions from the manufacturers of parts affecting safety and durability, clearly scheduled maintenance tasks that can be recorded in the ship's logbook and descriptions of the procedures for inspection. Attention is drawn to the *Code of safe working practices for merchant seafarers (COSWP)*.

■ *Section 2*

Rig calculation requirements

2.1 Modelling of the rig elements

2.1.1 Appropriate rig materials are selected by the designer. Modelling and assessment are done using techniques corresponding to the material of rig element.

2.1.2 Composite material is non-isotropic. Mid-plane methods may be used for global evaluation of in-plane stress in cases with balanced fibre layup. Any load transfer through the thickness of the material is to be considered to be carried by the matrix material only. The difference between the strength of the matrix material and the strength of the fibres is to be taken into account.

2.1.3 Metallic materials are isotropic but analysis is to be done using thin walled sections where appropriate and geometric accurate volume models where possible.

2.1.4 The analysis shall account for the load factors with respect to potential failures through global buckling, shear stiffness of spar tubes, thin-wall buckling, and other stability evaluations used in the design process.

2.1.5 Results are to be represented in a phenomenological material failure index such as the Tsai-Wu failure criterion. Individual component failure index values for compressive, tensile and shear strength are not considered suitable for evaluation.

2.2 Load cases

2.2.1 Sailing condition load cases are to be applied to the rig. Reference is made to LR’s *Guidance Notes for the Certification of Masts, Spars and Standing Rigging* for a minimal set of requirements when determining these loads.

2.2.2 All load cases are to be identified with a load case number.

2.2.3 Load cases that cover operation at sea are to include sails set, limiting wind and sea conditions with corresponding angle of heel and wind direction. A reefed storm condition may need to be considered depending on the operational profile of the craft.

2.2.4 Load cases in the manufacture, transport, installation and stepping/unstepping are to include but may not be limited to:

(a) Lifting operations:
  - With the correct number of lifting slings for each operation.
  - With a lifting acceleration of 0,5g.

(b) Laying down:
  - With the correct number of support points for each operation.

Load case assumptions are to be checked against handling procedures.

2.2.5 Loads in the survival condition are to be based on:

(a) Motions estimated from model tests or computation. In the absence thereof, accelerations and amplitudes given in *Table 7.2.1 Motions* may be applied.

(b) Wind speed of 63 m/s is to be assumed.

Table 7.2.1 Motions

Motion	Maximum single amplitude	Period in seconds
Roll	$\Phi = sin^{-1}\theta$ degrees but need not exceed 30° and is not to be taken less than 22°.	$T_r = \frac{0,7B}{\sqrt{GM}}$
Pitch	$\Psi = 12e^{-0,0033L_{pp}}$ degrees but need not exceed 8°.	$T_p = 0,5\sqrt{L_{pp}}$
Heave	$\frac{L_{pp}}{80}$	$T_h = 0,5\sqrt{L_{pp}}$
Where L_{pp}, B as defined in *Pt 3, Ch 1, 6.2 Principal particulars* GM transverse metacentric height of loaded craft, in metres $\theta = (0,45 + 0,1\frac{L_{pp}}{B})(0,54 - \frac{L_{pp}}{1270})$		

2.2.6 Dynamic loads in sailing conditions are to be determined from simulations or other established computation techniques. In the absence of this information, an allowance for dynamic loads by a multiplication factor of 1,33 on the combination of load by wind and own weight is to be taken.

2.3 Stress factors (SF)

2.3.1 The stress factors given in this Section are related to the Characteristic Failure Stress (CFS). The CFS is the stress at which, for the material loaded in the way it is loaded in the rig structure, the probability of breakage does not exceed 5 per cent.

2.3.2 Permissible stress is to be calculated using:
Permissible stress = SF * CFS
For composite materials, the CFS to be used for scantling calculation purposes is to be 90 per cent of the mean first ply/resin cracking failure determined from accepted mechanical tests, or the mean values minus two times the standard deviation of not less than 5 representative samples, whichever is the lesser. All test pieces are to be representative of the product to be manufactured and details of them are to be submitted for consideration.

2.3.3 Stress factors (SF) are related to modes of operation (seagoing, survival) and are given in *Table 7.2.2 Stress factors (SF) for seagoing and survival conditions.*

Table 7.2.2 Stress factors (SF) for seagoing and survival conditions

Condition	Metal	Composite
Controlled condition during manufacture/stepping/maintenance	0,80	0,33
Masts and spars in sailing condition	0,65	0,25
Masts and spars in survival condition	0,80	0,33
Standing rigging in sailing condition	0,53	0,27 (carbon) 0,37 (PBO)
Standing rigging in survival condition	0,68	0,34 (carbon) 0,47 (PBO)

Note 1. If a significant part of the load under consideration is a personnel load, then the stress factor is not to exceed 0,4 for metal or 0,17 for a composite material.

Note 2. For masts and spars, the stress factors are valid for both tensile and compression load types. Proposals to use a separate factor for compression will be subject to special consideration.

Note 3. Where an element is subjected to a combined load, such as bending and compression, this combination is also to be considered using $\frac{\sigma_b}{\sigma_y} + \frac{\sigma_a}{\sigma_c}$ for metallic elements where:

Where:
σ_b is the bending stress in the mast section under consideration
σ_y is the tensile yield stress for the material
σ_a is the axial stress in the mast section under consideration
σ_c is the critical buckling for the mast section

Other materials will be specially considered. *See also Pt 3, Ch 7, 2.1 Modelling of rig composite elements 2.3.3*.

Note 4. Stress factors for other sailing conditions are to be agreed with LR in the load case definition phase.

Note 5. For composite materials, *see Pt 8, Ch 1, 2.5 Material data sheet*.

■ *Section 3*
Materials and components and arrangement

3.1 Materials

3.1.1 The materials used in the construction of the mast and spars are to be manufactured and tested in accordance with the appropriate requirements of the *Rules for the Manufacture, Testing and Certification of Materials, July 2019*.

3.1.2 For composite materials, *see Pt 8, Ch 1, 2.5 Material data sheet*.

3.1.3 Where stainless steel rigging is employed, particular attention is to be given to the selection of the grade of material used, as some stainless steels are prone to stress corrosion cracking and consequent fatigue failure, the onset of which is not readily observed. Suitable insulation is to be provided between differing materials to avoid galvanic corrosion.

3.2 Components

3.2.1 Components for rigs are to be manufactured, tested and documented in accordance with *Table 7.3.1 Summary of testing and associated documentation for rig components* under a suitable quality control system.

Table 7.3.1 Summary of testing and associated documentation for rig components

Part	Testing/inspection	Verification; final document to be issued
Mast and spreader tubes	Visual inspection	Materials properties certificate
Spars	Visual inspection	Materials properties certificate
Flettner rotor	Visual inspection	Materials properties certificate
Rigging wire and end connections	Break load testing	W - test certificate; or Type approval certificate
Rod and carbon rigging systems	Visual inspection	Type approval certificate
Loose items	Visual inspection	CE or other agreed standard
Key: W: witnessing by LR Surveyor		

3.3 Arrangement

3.3.1 Drainage is to be provided to prevent the build-up of seawater and condensation within the mast structure.

3.3.2 Where appropriate, rigs should be coated internally with a suitable preparation.

3.3.3 Openings in the masts for entry and exit of running rigging or cables should be adequately compensated with insert plates, doublers or patching.

3.3.4 Standing rigging is to be effectively attached to the mast, deck and hull structure and is to be so designed that it cannot become unintentionally disconnected during operation.

■ *Section 4*
Rig support

4.1 General

4.1.1 Assessment of rig support structures (e.g. mast step, chain plates, winch foundations and strong points) as outlined in this Section is part of the hull appraisal. The assessment is not part of the **RIGGING** or **RIGGING*** notations, but loads are to be considered in the design evaluation report of the TCF.

4.2 Support arrangements

4.2.1 Sailing yacht mast and standing rigging loadings and their support structure require special consideration as follows:

- Efficient integration of the mast into the hull.
- Adequate hull and deck longitudinal structure to resist hull bending.
- Provision of adequate transverse structure in way of masts, chainplates, keels, skegs etc.
- Provision of adequate bottom structure to support the mast and dissipate the mast loadings.
- Local reinforcement in way of chainplates, forestay and backstay fittings, etc.
- The deck and beams are to be suitably strengthened in way of masts, coachroof/deckhouse ends, windlass, cleats, sheet winches, sheet tracks etc. Where a mast is stepped on the deck or coachroof/deckhouse, the structural arrangements will be specially considered.

4.2.2 Details of the designer's/Builder's calculated maximum loads on the mast heel and the breaking loads of all standing rigging are to be submitted with the main structural plans for appraisal.

4.3 Bowsprits

4.3.1 The hull structure in way of the bowsprit is to be suitably reinforced with due account taken of the compressive loads along the bowsprit and bending moments due to rigging loads.

4.3.2 Details of the designer's/Builder's calculated maximum loads on the bowsprit and the breaking loads of all associated standing rigging are to be submitted with the main structural plans for appraisal.

4.4 Chainplates

4.4.1 Chainplates and other securing arrangements to take the loads of all standing rigging for masts and bowsprits, are to be of substantial construction and well integrated with the hull and/or deck supporting structure. They are to be of sufficient strength that, in the event of failure of the standing rigging, the watertight integrity of the hull is not impaired.

4.4.2 The breaking loads of all mast and bowsprit standing rigging, together with the actual loads imposed by the rigging, are to be submitted.

4.4.3 The minimum load to be applied to chainplates is the lesser of the breaking load or 2,5 times the maximum working load of the rigging. Each item of the supporting structure is to have a factor of safety applied as specified in *Table 7.4.1 Factors of safety for rig support items*.

Table 7.4.1 Factors of safety for rig support items

Item	Factor of safety
Lug, eyebolt eye	1,2
Lug to baseplate	1,2
Eyebolt/base to foundation	2,0
Chainplate to foundation (below decks)	2,0
Chainplate foundation to hull structure	2,0

■ *Section 5*
Rig stepping

5.1 General

5.1.1 The rig dressing, i.e. dockside fitting of mast gear, and stepping, i.e. righting of the mast, is to be witnessed by an LR Surveyor.

5.1.2 The transport, stepping and tuning procedures are to be provided by the manufacturer.

5.2 Record of stepping

5.2.1 Two copies of the transport and stepping procedures with confirmation that the dressing and stepping was carried out under LR supervision is to be signed by the Surveyor and the Rigger. One copy is to be placed on board the vessel and the other submitted to LR.

5.2.2 The dock tuning procedure, i.e. step by step tightening of stays and jacking up of the mast, may be carried out without supervision of the Surveyor.

5.2.3 The initial pre-tension applied to the rig is to be measured and recorded for intermediate stages and the final state. These recorded values are to be included in the rig stepping report.

■ *Section 6*
Rig behaviour trial

6.1 General

6.1.1 The rig behaviour at sea is to be witnessed by an LR Surveyor.

6.2 Rig behaviour

6.2.1 The expected behaviour of the rig when fitted to the vessel is defined by the manufacturer. The manufacturer is to provide predictions for key parameters such as heel angle, mast compression, loads in stays and loads on sheets for a range of weather conditions as may be encountered during the rig trial.

6.2.2 The rig behaviour trial is to include:

- 3 sailing conditions described in the rig operations manually, typically covering close hauled, reaching and running conditions.
- Transition between the sailing conditions.
- The process of setting, reefing and changing of sails in accordance with the procedure.

6.2.3 Observations made during trials are to focus on agreement between predicted condition and actual performance, as well as the transitions between conditions.

6.3 Record of trials

6.3.1 Two copies of the trial schedule and observed behaviour, signed by the Surveyor and Builder are to be provided on completion of the trial. Once copy is to be placed on board the vessel and the other submitted to LR.

Part 4, Chapter 2
All Yachts

▪ *Section 6*
Protection of openings

6.5 Portlights, windows and skylights

6.5.5 ~~Chemically toughened glass may be used in lieu of thermally toughened glass for portlights and windows provided it can be demonstrated the strength of the arrangement is at least equivalent in strength to that of unlaminated thermally toughened glass. The glazing system is to be of laminated construction and the method of testing will be specially considered. The minimum case depth of chemical strengthening is to be 30 microns.~~ Laminated glass is to be in accordance with *Pt 3, Ch 4, 7.9 Laminated glass thickness*. Laminated glass may include chemically toughened glass (CTG), thermally toughened safety glass (TTG) or heat strengthened glass (HSG). *See also Pt 3, Ch 4, 7.10 Other glazing materials*. The glass is to be in accordance with a recognised International Standard, e.g. ISO 11336 (Parts 1 to 3).

6.5.6 Wheelhouse windows are to be of toughened safety glass or of laminated construction.~~, or where they are of laminated or sandwich construction, the surface layers are to be of toughened safety glass.~~

Part 4, Chapter 3
Special Considerations for Sailing Yachts

■ *Section 1*
Hull design and construction parameters

1.1 Plans and data

(Part only shown)

1.1.1 In addition to the general plans and data required by *Pt 3, Ch 1, 5 Information required* the following details of additional structural components, particular to sailing yachts, are to be submitted for appraisal:

- Mast partners.
- Boom and gaff.
- Chainplates,~~ code F~~urler, forestay and backstay attachments.
- Deck hardware plan.
- Deck fitting for cleats, sheet winches, sheet tracks, travellers etc.
- Through-deck fittings.
- Mast and spreader sections.

Part 6, Chapter 2
Construction Procedures

■ *Section 3*
Procedures for welded construction

3.5 Inspection and non-destructive examination

3.5.1 Inspection of welded construction is to be conducted in accordance with the requirements specified in Ch 13 Requirements for Welded Construction of the ~~Rules for Materials~~ *Rules for the Manufacture, Testing and Certification of Materials, July 2019*, and the general NDE requirements as per *Ch 1, 5.1*

Part 6, Chapter 6
Hull Girder Strength

■ *Section 2*
Hull girder strength for mono-hull craft

2.3 Minimum hull section modulus

2.3.1 For patrol craft in Service Group G6, the hull midship modulus about the transverse neutral axis, at the deck or the keel, is to be not less than:

~~$Z_{min} = \eta_{HTS} L_f L_{2R} B_{WL} (C_b + 0{,}7) 10_{-6}\ m^3$~~

$$\boxed{Z_{\mathrm{min}} = k_{\mathrm{L}} L_{\mathrm{f}} L_{\mathrm{R}}^2 B_{\mathrm{WL}} (C_{\mathrm{b}} + 0{,}7) 10^{-6}\ \mathrm{m}^3}$$

where

k_{L} is the higher tensile steel factor

$$\boxed{= \frac{235}{\sigma_a \eta_{\mathrm{HTS}}}}$$

where

σ_a is the specified minimum yield stress in N/mm^2, as defined in *Pt 6, Ch 2, 2.4 Mechanical properties for design 2.4.3*

η_{HTS} is the higher tensile steel concentration factor as defined in *Pt 6, Ch 2, 2.4 Mechanical properties for design 2.4.3*

~~η_{HTS} = is as defined in *Pt 6, Ch 2, 2.4 Mechanical properties for design 2.4.3*~~

L_{R} and C_{b} = are as given in *Pt 5, Ch 5, 2.2 Vertical wave bending moments*

C_{b} = to be taken not less than 0,6

L_{f} = are as given in ~~*Pt 5, Ch 2, 2.2 Symbols 2.2.2*~~ *Pt 5 Ch 5, 2.2 Vertical wave bending moments 2.2.1*

B_{WL} = maximum breadth at the design waterline, in metres.

Part 7, Chapter 2
Construction Procedures

■ *Section 3*
Procedures for welded construction

Section 3.6 Inspection and non-destructive examination

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Part 14, Chapter 1
Steering Systems

■ *Section 6*
Control, monitoring and electrical equipment

6.1 Control

6.1.9 In the event of detecting a control system failure, which is likely to cause uncontrolled rudder movements, *see Table 1.6.1 Alarms*, the rudder is to retain its position at the time of failure without manual intervention. Alternatively, consideration will be given to the rudder moving to and retaining a position which is necessary for safe navigation of the vessel or to return to the mid-ship position where technical justification is submitted and is found to be satisfactory.

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